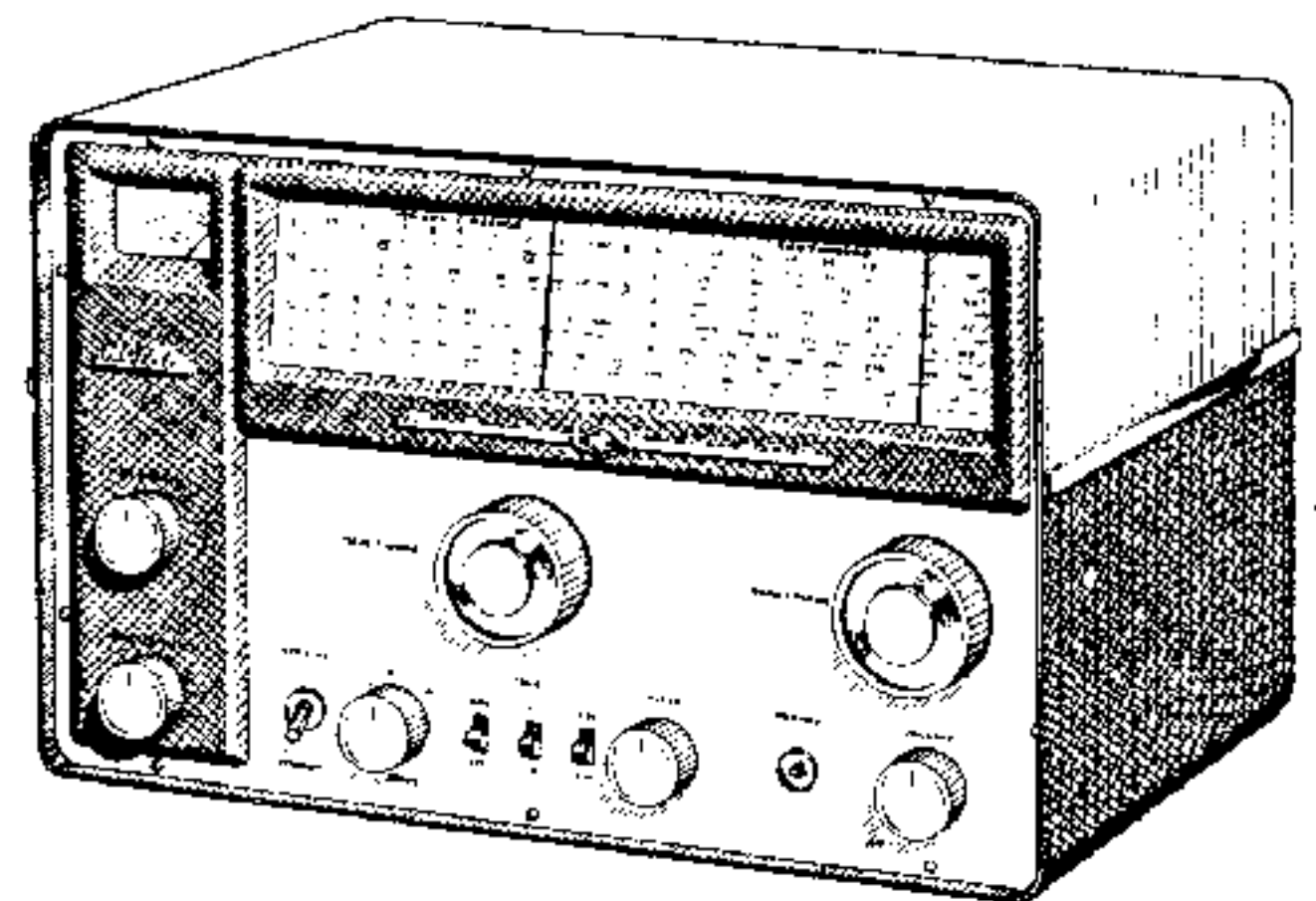


The **NATIONAL**
NC 188
COMMUNICATIONS RECEIVER



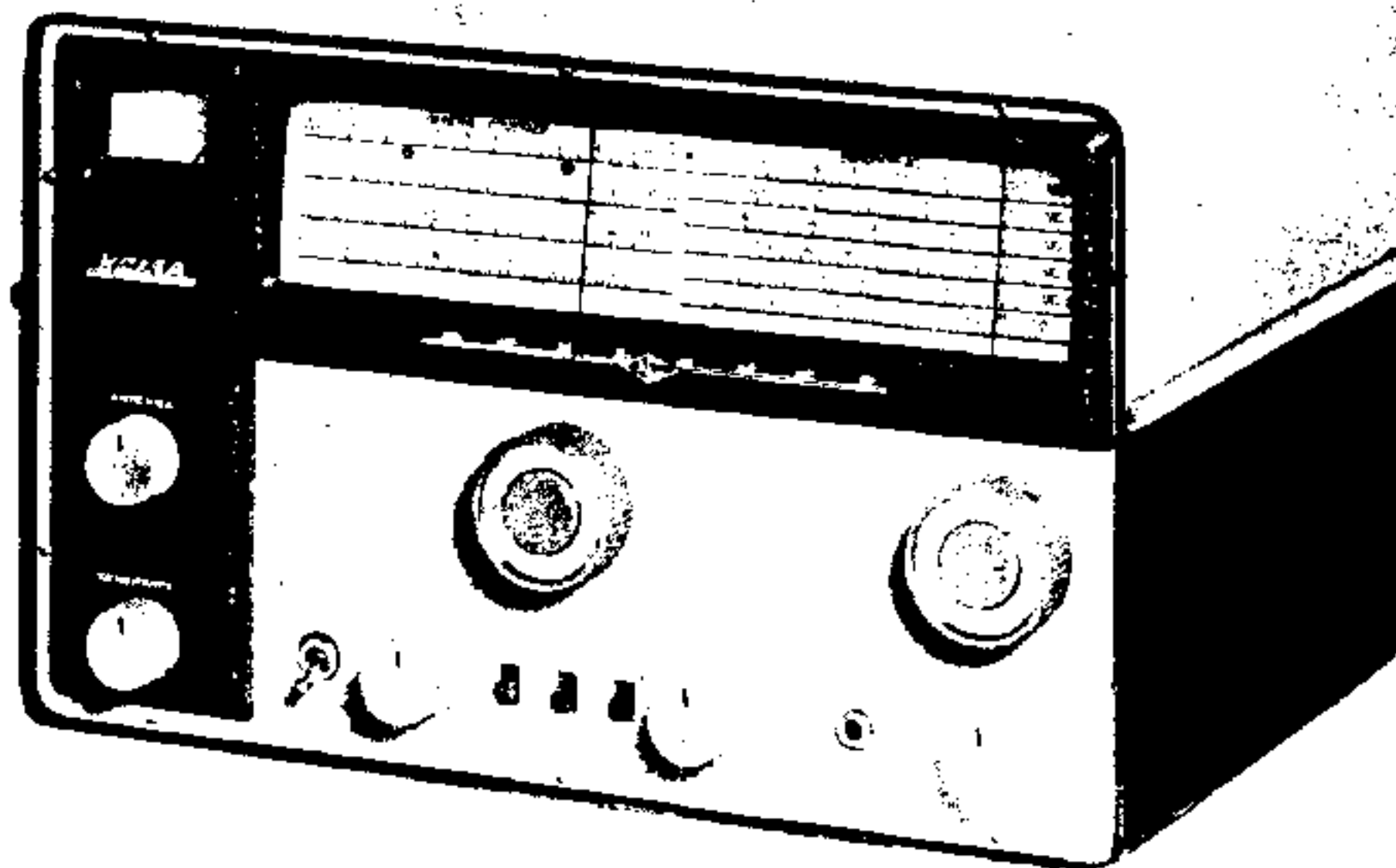


Figure 1-1. The National NC188 Receiver

SECTION 1. DESCRIPTION

1.1 GENERAL

Your National NC188 is a modern superheterodyne communications receiver designed to fulfill present day operating requirements of the amateur radio operator and short-wave listener. The frequency range of your NC188 covers 160 through 10 meter amateur, foreign broadcast, police, commercial, marine, and standard broadcast bands.

A bandswitching arrangement in your NC188 allows continuous tuning of the 0.54 mc to 40.0 mc general coverage frequency range. This bandswitching arrangement separates the overall frequency range of the receiver into four bands as follows:

BAND	FREQUENCY COVERAGE
A	0.54 mc to 1.6 mc
B	1.6 mc to 4.7 mc
C	4.6 mc to 15.0 mc
D	14.0 mc to 40.0 mc

Bandspread tuning is provided to take full advantage of the receiver's high degree of selectivity. Your NC188 includes calibrated bandspread scales for each of the six major amateur bands and a logging scale for the various short-wave bands.

An S-meter is provided to serve as a tuning indicator and to show the relative strength of incoming AM signals. The meter is calibrated in "S" units from 0 to 9 and in decibels over S9 from 0 to 40 db.

A phone jack is located on the front panel for the convenience of the operator. Headphone impedance is not critical. The phone jack will accept a standard phone plug which automatically disconnects the loudspeaker.

1.2 CIRCUIT DESCRIPTION

Eight miniature vacuum tubes and a rectifier are used in the receiver. Table I lists these tubes, their functions, and their schematic diagram reference symbols.

TABLE I
VACUUM TUBES AND FUNCTIONS

REF. SYM.	TUBE TYPE	FUNCTION	REF. SYM.	TUBE TYPE	FUNCTION
V1	6BA6	RF Amplifier	V6	6C4	HF Oscillator
V2	6BE6	Mixer	V7	5Y3	Rectifier
V3	6BA6	1st IF Amplifier	V8A	1/2 12AT7	CW Oscillator and S-meter Amplifier
V4	6BA6	2nd IF Amplifier	V8B	1/2 12AT7	1st Audio Amplifier
V5A	1/2 6AL5	Detector and AGC	V9	6AQ5	Audio Output Amplifier
V5B	1/2 6AL5	Noise Limiter			

CAUTION

YOUR NC188 IS DESIGNED TO OPERATE FROM A 105 TO 130 VOLT 50 TO 60 CYCLE AC SOURCE ONLY. CONNECTION TO A DC SOURCE WILL CAUSE SERIOUS DAMAGE.



SECTION 2. INSTALLATION

2.1 UNPACKING

The packing materials for your NC188 have been carefully selected to minimize the possibility of injury to the receiver under normal shipping and handling conditions. To prevent damaging your receiver when removing it from its carton the procedure outlined below should be followed:

- Remove the top pad and cover insert.
- Remove rear insert.
- Slide the receiver back in its carton to free the front insert.
- Remove front insert.
- Your receiver may now be removed from its carton.

2.2 INITIAL SETUP

Your NC188 has been carefully inspected and tested before shipment and is ready to put into operation. It is recommended that your receiver be placed in such a position that the rear of the set is at least two inches from any obstruction to allow adequate ventilation.

A terminal strip is provided for loudspeaker connection (see figure 2-1). The receiver output is designed to match a loudspeaker voice coil impedance of 3.2 ohms. A National NTS-1 matching speaker (see figure A-1) is recommended for use with your NC188.

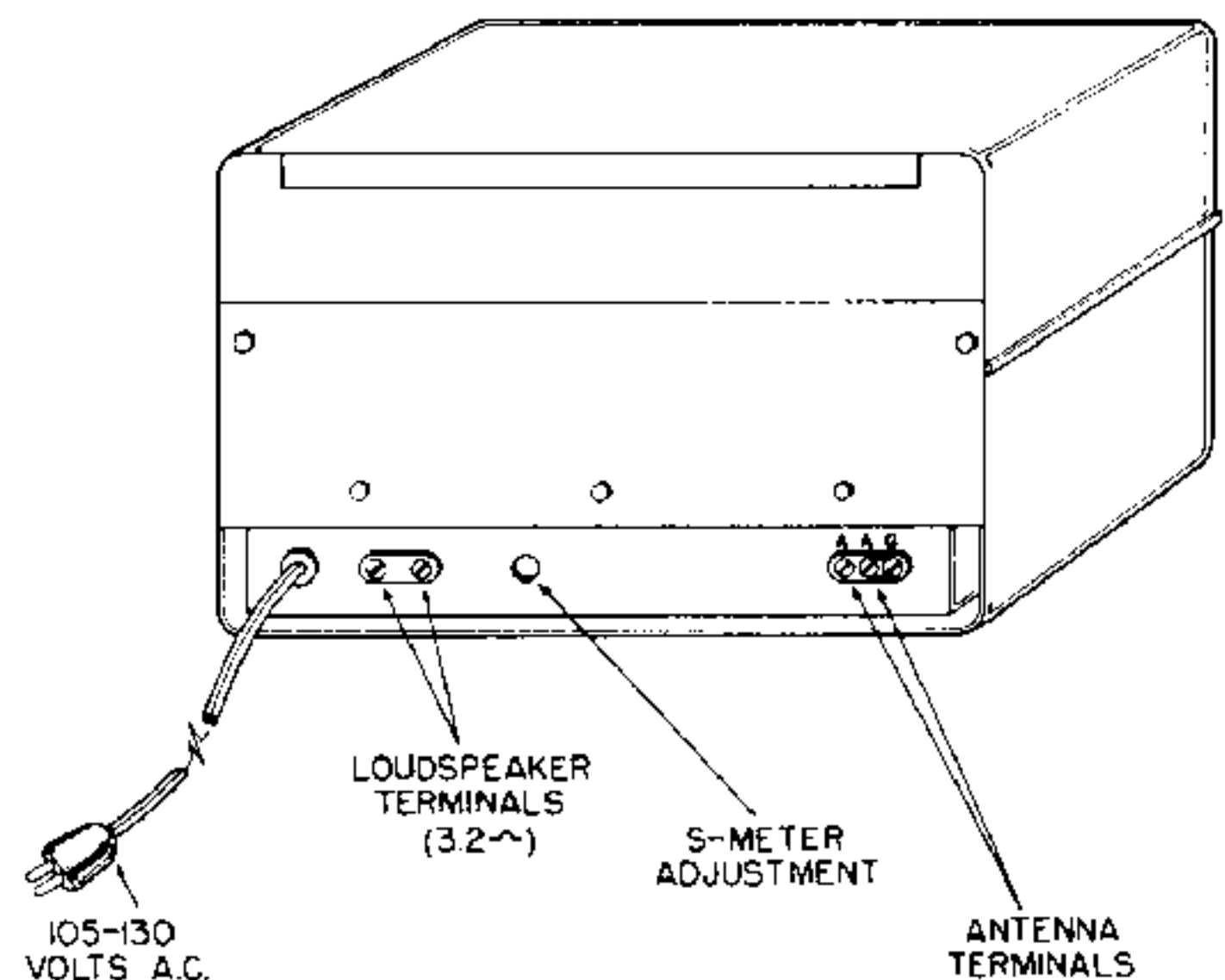


Figure 2-1. Rear View NC188 Receiver

The most practical antenna for use in installations where your receiver is to be used over a wide range of frequencies is the single-wire type. A typical single-wire antenna hookup is illustrated in figure 2-2.

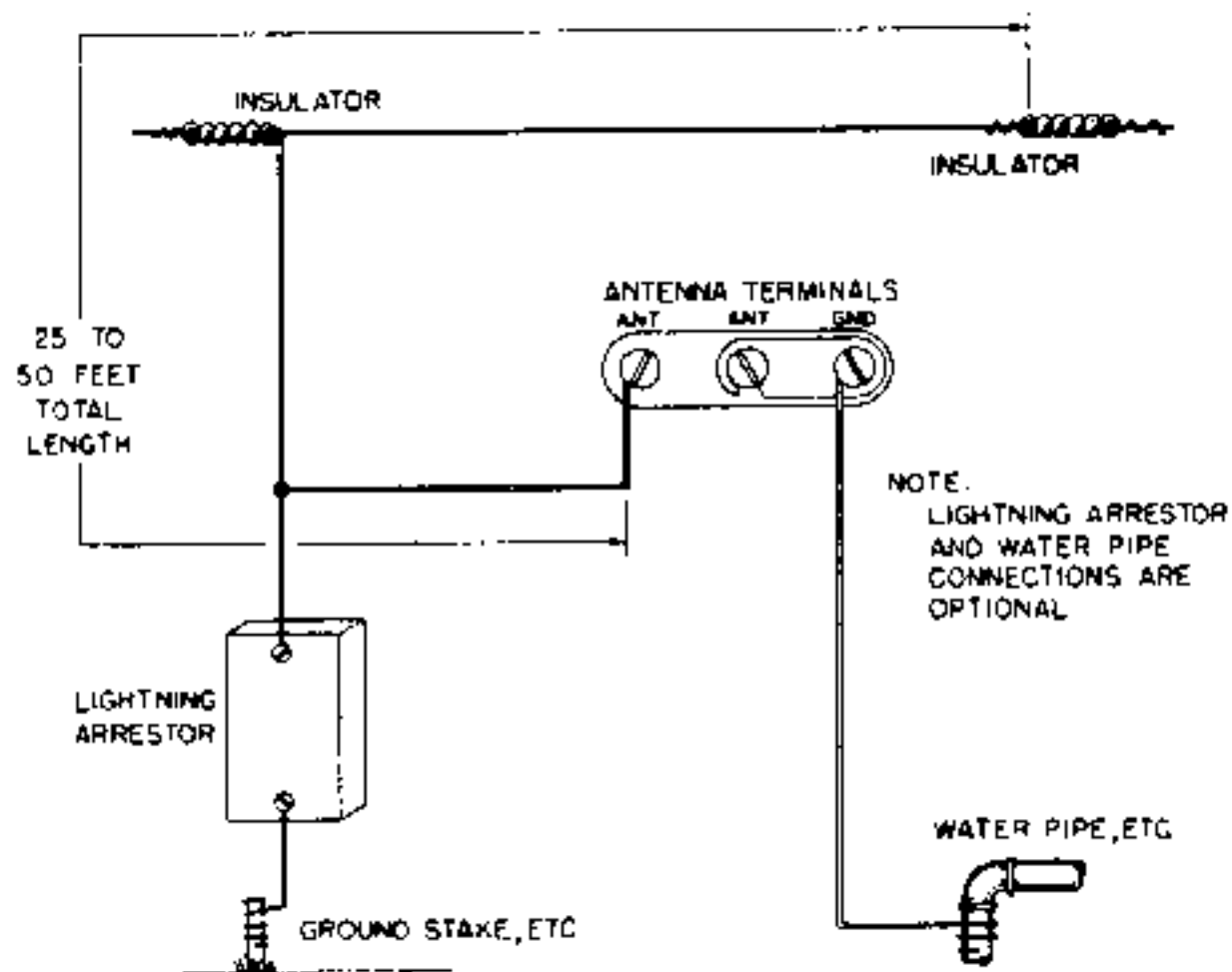


Figure 2-2. Typical Single-Wire Antenna Hookup

In some cases it may be desirable to use an antenna specifically designed for use in a particular frequency range. Figure 2-3 shows a doublet antenna hookup suitable for this type of operation and gives construction details.

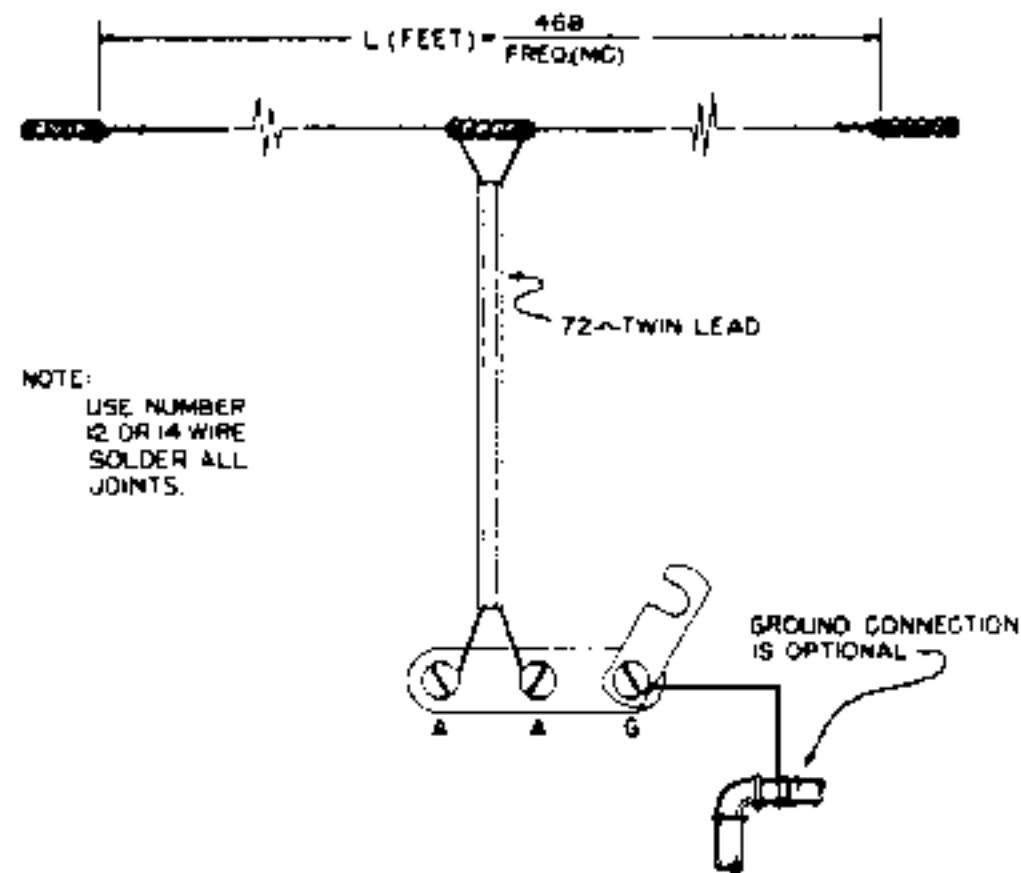


Figure 2-3. Typical Doublet Antenna Hookup

SECTION 3. OPERATION

3.1 CONTROLS

All controls and indicators required to operate your NC188 are located on the front panel (see figure 1-1). The diagram on the following page (figure 3-1) shows the location of the operating controls and switches.

3.2 OPERATING PROCEDURES

The initial settings of the operating controls are shown in Table II. The following control adjustments are required when your receiver is in operation.

TABLE II
INITIAL CONTROL SETTINGS

CONTROL	AM SETTING	CW SETTING
OFF-VOLUME	Mid position	Maximum
SENSITIVITY	Maximum	Mid position
STANDBY-RECEIVE Switch	RECEIVE	RECEIVE
BAND	Set for desired range	Set for desired range
ANL-OFF Switch	OFF	OFF
HI-LO Switch	Optional	LO
AM-CW Switch	AM	CW
PITCH	Inoperative	Mid position
ANTENNA	Mid position	Mid position
BANDSPREAD	SET	SET

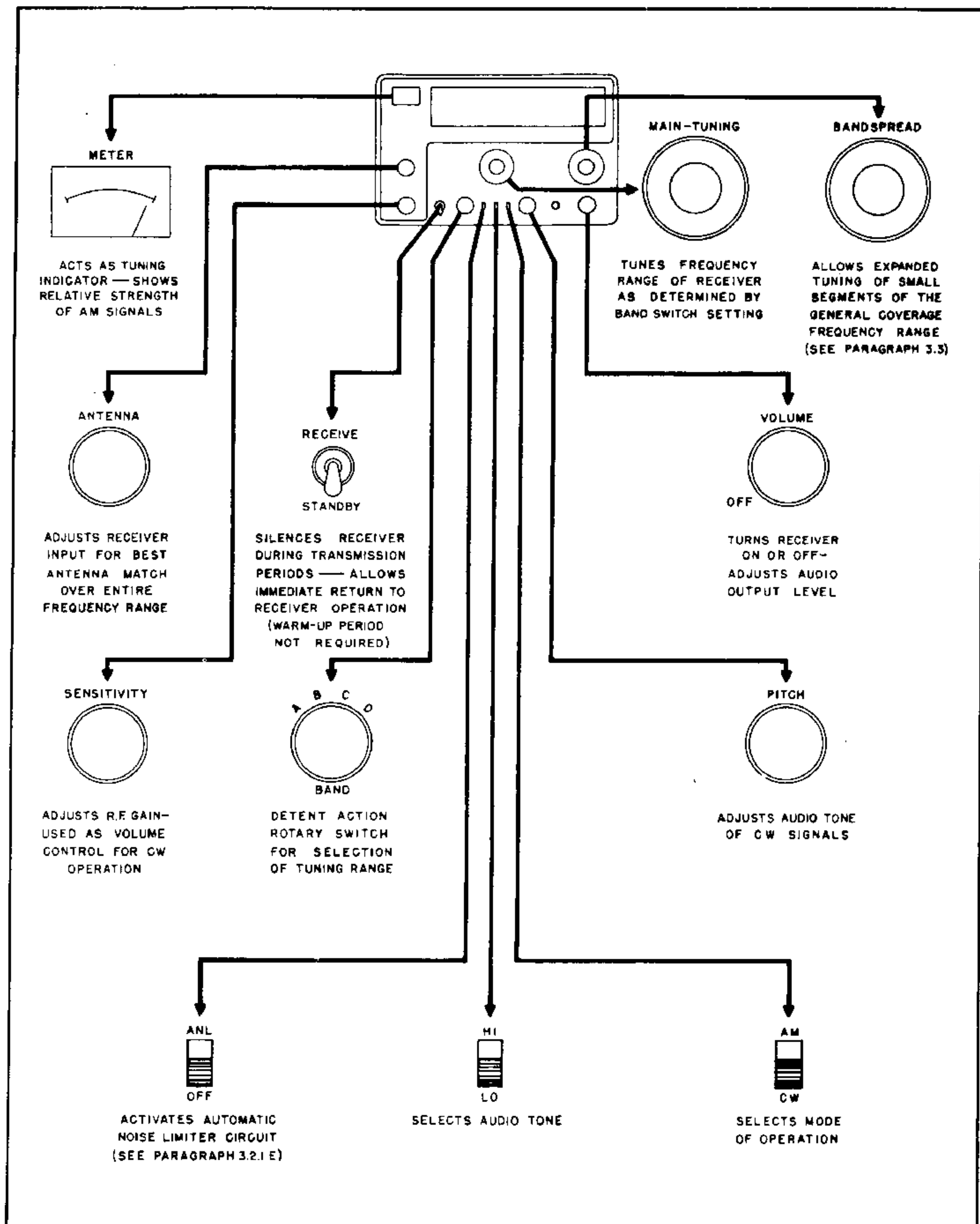


Figure 3-1. Location and Functions of Controls

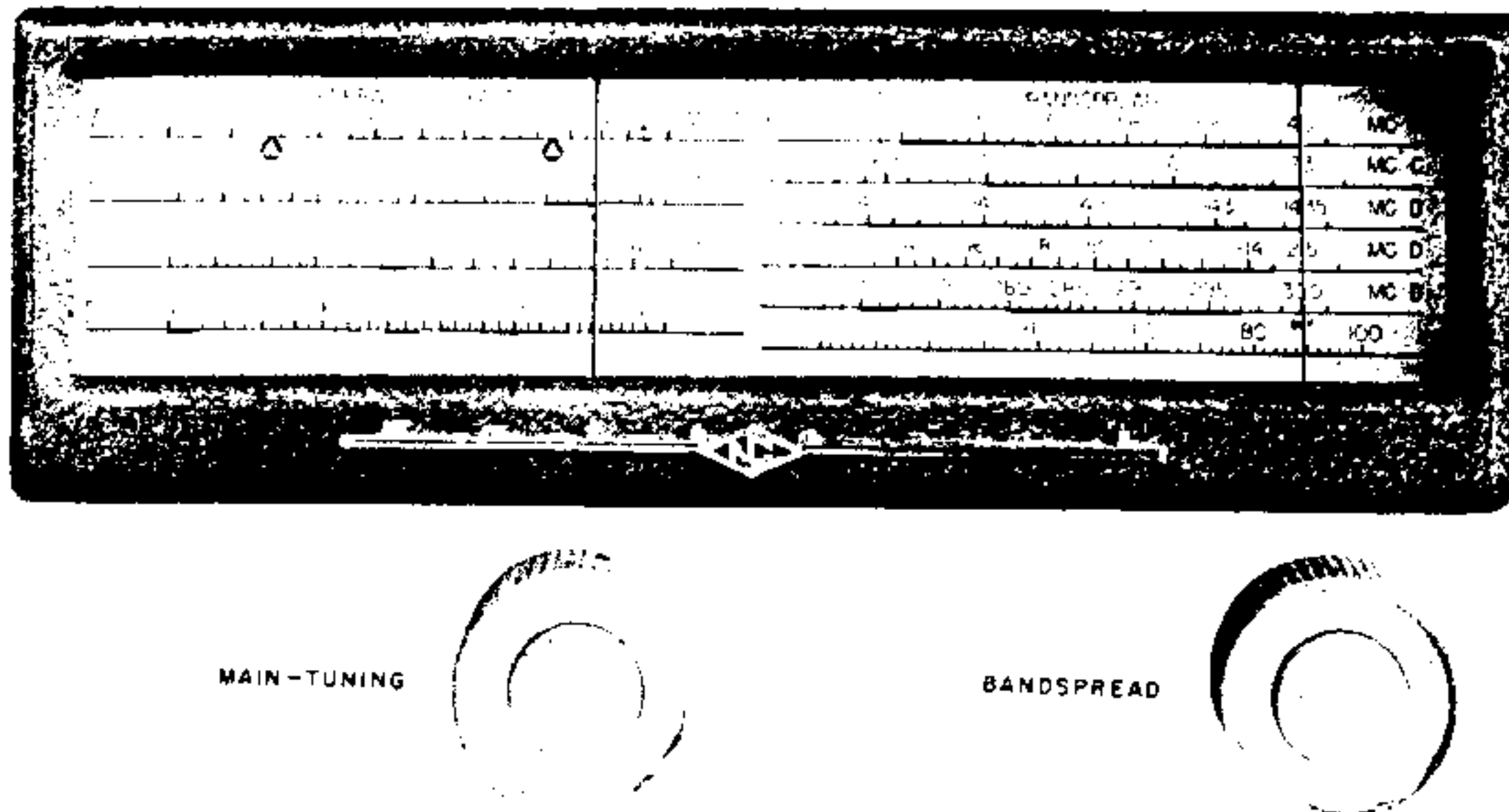


Figure 3-2. NC188 Dial Scales and Tuning Controls


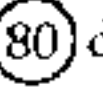
3.2.1 AM Operation

- a. Tune in a station by adjusting the MAIN TUNING control.
- b. Tune slightly off-frequency to a point where no signal is heard and adjust the ANTENNA control for maximum background noise. This ANTENNA control setting is satisfactory while operating over a limited frequency range. Reset the MAIN TUNING control to receive the desired signal.
- c. Strong signals may cause your receiver to become overloaded. In this case, adjust the SENSITIVITY control for an S-meter reading of less than 40 db above S9.
- d. Adjust the VOLUME control for a comfortable listening level.
- e. If excessive spurious noises (such as those caused by auto ignition) are heard, place the ANL-OFF switch in its ANL position. The automatic noise limiter tends to reduce the overall efficiency of the receiver and should be used only when necessary.

3.2.2 CW Operation

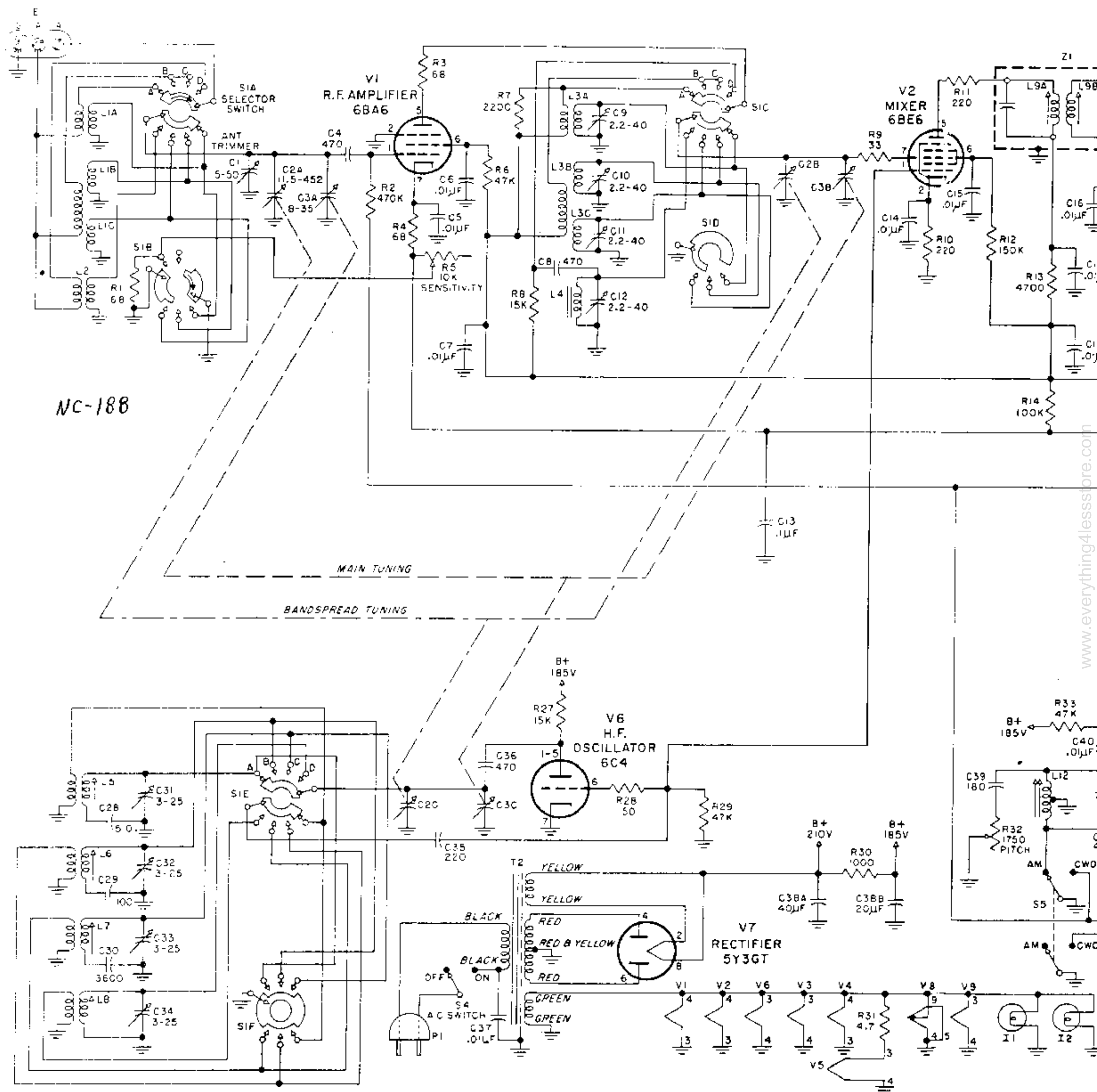
- a. The SENSITIVITY control is used as a volume control for CW operation and should be adjusted accordingly.
- b. Adjust the PITCH control for a pleasing note.
- c. All other adjustments are the same as for AM operation.

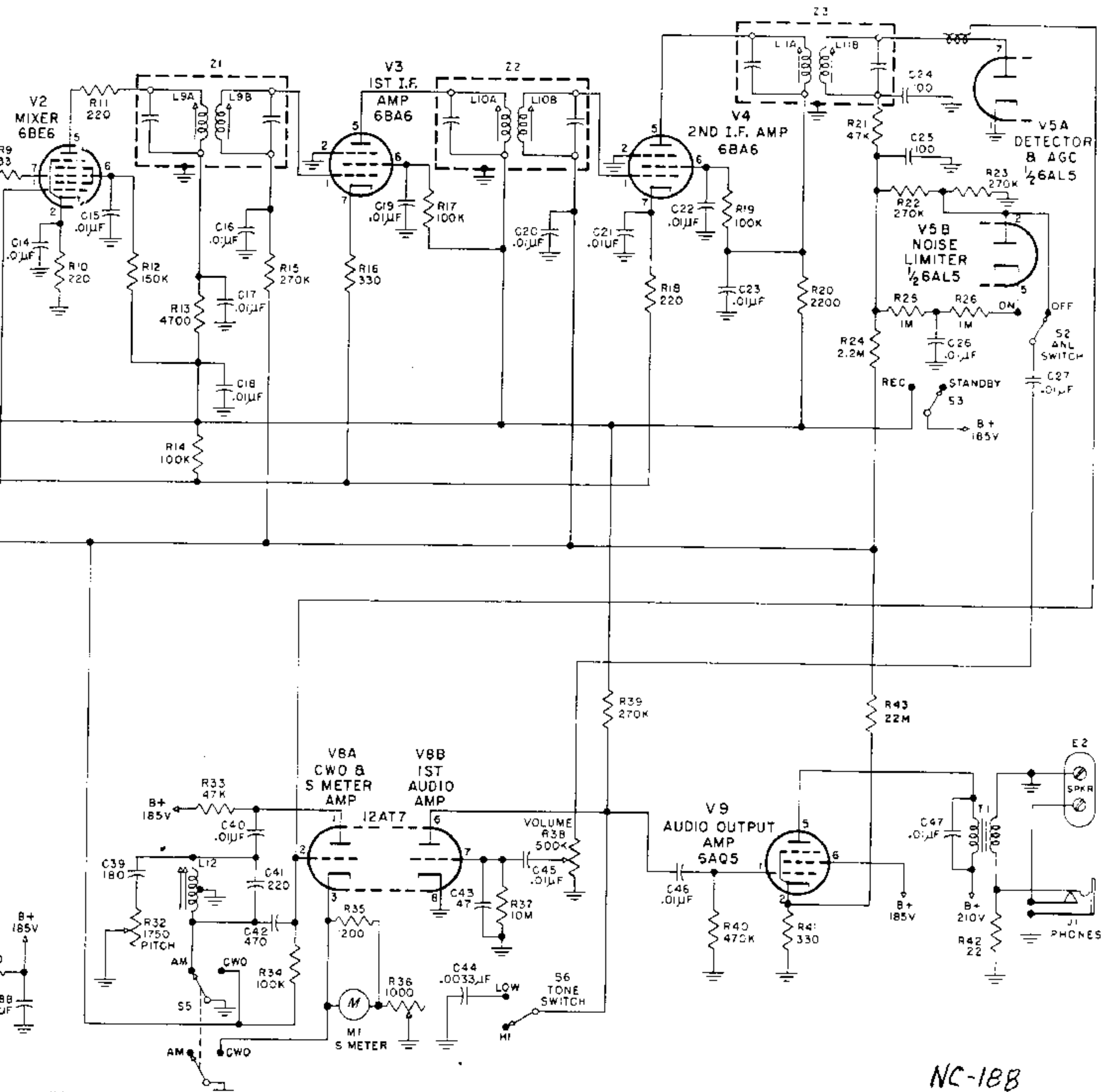
3.3 TUNING

The GENERAL COVERAGE and BANDSPREAD scales (see figure 3-2) are calibrated in megacycles and contain special markings to simplify tuning. The CONELRAD frequencies, .64 mc and 1.24 mc, are indicated on band A by the civil defense symbol . The major amateur radio bands are contained in bands B, C and D. Each amateur band is underlined in black on both the GENERAL COVERAGE and BANDSPREAD scales. On the GENERAL COVERAGE scale the amateur bands are identified by a circle which is located at the high end of each band and contains the bands wavelength designator () designates the 80 meter amateur band).

Short-wave bandspreading, for other than amateur bands, is accomplished by setting the BANDSPREAD pointer at SET and the GENERAL COVERAGE pointer at the high end of the short-wave band to be tuned. Adjust the BANDSPREAD control to select the desired station. Notation of the points on both scales where the desired station was located will enable the operator to locate the same station in the future without difficulty.

Calibration of the GENERAL COVERAGE scales is correct when the BANDSPREAD pointer is in its SET position. For correct bandspreading of the amateur bands, the GENERAL COVERAGE pointer must be set in the center of the designator circle for the band to be tuned. Figure 3-2 shows the correct pointer positions for bandspreading the 80 meter amateur band,





NOTES:
CAPACITOR VALUES IN MICROMICROFARADS
EXCEPT AS INDICATED
RESISTOR VALUES IN OHMS
K = 1,000
M = 1,000,000

NC-18B

3.4 MEASUREMENT OF SIGNAL STRENGTH

The S-meter provides a means of measuring the relative strength of incoming AM signals. Accurate measurements of relative signal strength are taken with the SENSITIVITY control set in its extreme clockwise position. These measurements are read in S units from 1 to 9 and in decibels above S9 from 0 to 40 db. The S-meter circuit is disabled under CW operating conditions.

A screwdriver control located at the rear of the receiver is provided for zeroing the S-meter electrically. This adjustment is made with the antenna disconnected and the sensitivity control set at maximum.

3.5 SHORT-WAVE LISTENING

Bands B, C and D are the high frequency or short-wave bands. The frequency range of these bands covers short-wave foreign broadcast, amateur, and commercial radio transmitting stations all over the world. There are literally millions of radio stations in operation today most of which transmit signals within the tuning range of your NC188.

The principal short-wave broadcast stations operate on five major and two minor bands. One characteristic of short-wave is that reception will be good on some bands at certain times of day and, at the same time, poor on other bands. Table III lists the major short-wave broadcast bands, their frequencies, and their normal signal strength characteristics at different times of day.

TABLE III
SHORT-WAVE LISTENING SCHEDULE

BAND	17 METER	19 METER	25 METER	31 METER	49 METER
FREQUENCY RANGE (MC)	17.7-17.9	15.1-15.45	11.7-11.95	9.5-9.8	6.0-6.2
SUNRISE TO NOON	Eastern stations good	Same as 17 meter	West and southwest	Same as 25 meter	Same as 25 meter
NOON TO SUNSET	South good	East and south good	Same as 19 meter	East good	Most signals weak
SUNSET TO MIDNIGHT	Stations fade-band goes dead	Same as 17 meter	East fades south strong	Same as 25 meter	North, south and east very good



SECTION 4. SERVICE

4.1 GENERAL

Information contained in this section will aid qualified service personnel in servicing and aligning your NC188.

4.2 REMOVING THE CHASSIS

All knobs, the rear cover, and cabinet feet must be removed before the chassis can be taken out of the cabinet. All knobs are push-on type except the two large tuning knobs which are held in place by set screws. The rear cover is held on by five drive screws. Recessed drive screws in the cabinet feet hold the chassis in the cabinet.

4.3 ALIGNMENT

The following test equipment is required to align your NC188:

- a. AM signal generator having:
 - (1) 30% modulation at 400 cps.
 - (2) Frequency range from 455 kc to 40 mc.
- b. Output meter.

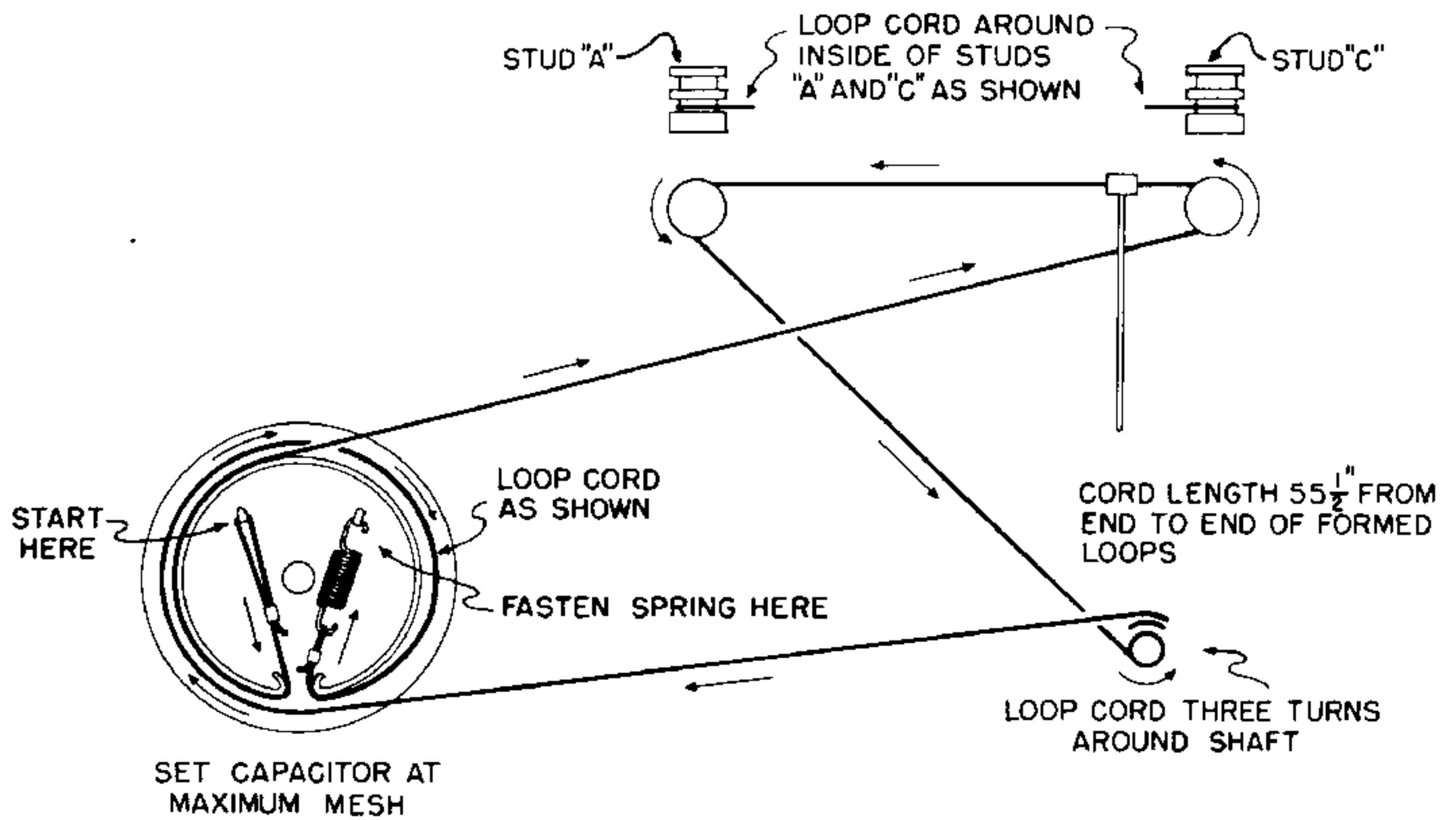
To align the IF section connect a shorting jumper from the AVC bus to the chassis, an output meter to the speaker terminals, and connect a signal generator delivering a 455 kc signal modulated 30% at 400 cps to the middle stator lug of the main tuning condenser (C3B). Adjust top and bottom slugs of Z1, Z2 and Z3 for maximum output. To prevent overloading adjust the SENSITIVITY control (R5) to keep output meter readings below 100 milliwatts.

The following illustrations are included as service aids:

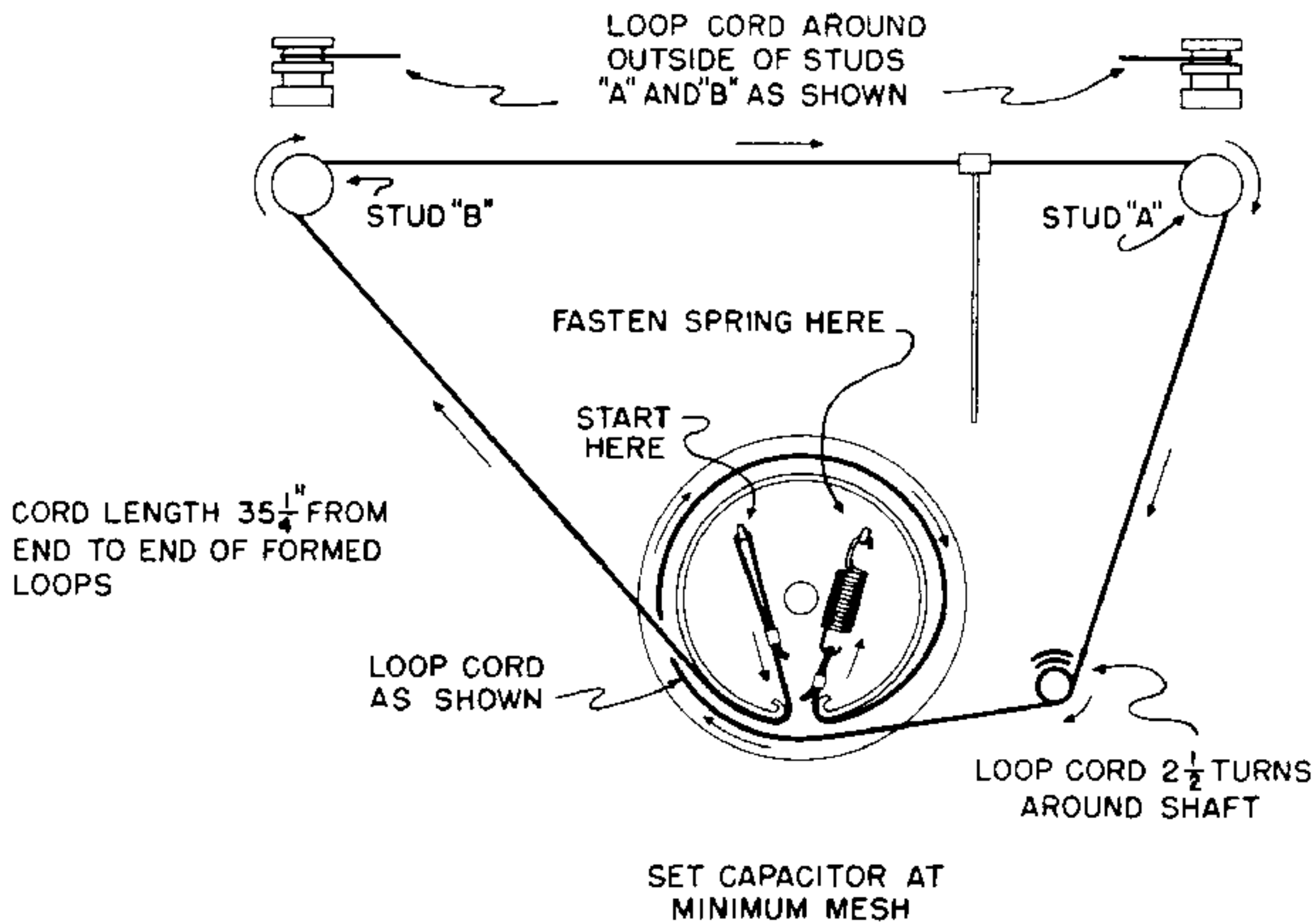
Table IV RF Alignment Chart
 Figure 4-1 Dial Stringing Diagrams
 Complete Schematic Diagram

TABLE IV
RF ALIGNMENT CHART

BAND	A	B	C	D
LOW END				
SET GENERATOR	0.6 mc	1.6 mc	5 mc	14 mc
SET MAIN TUNING	0.6 mc	1.6 mc	5 mc	14 mc
ADJUST TO TUNE	L5	L6	L7	L8
ADJUST FOR MAX			Loop in L3C	L4
HIGH END				
SET GENERATOR	1.5 mc	4 mc	14 mc	30 mc
SET MAIN TUNING	1.5 mc	4 mc	14 mc	30 mc
ADJUST TO TUNE	C31	C32	C33	C34
ADJUST FOR MAX	C9	C10	C11	C12



BAND SPREAD DIAL CORD ASSEMBLY



GENERAL COVERAGE DIAL CORD ASSEMBLY

Figure 4-1. Dial Stringing Diagrams

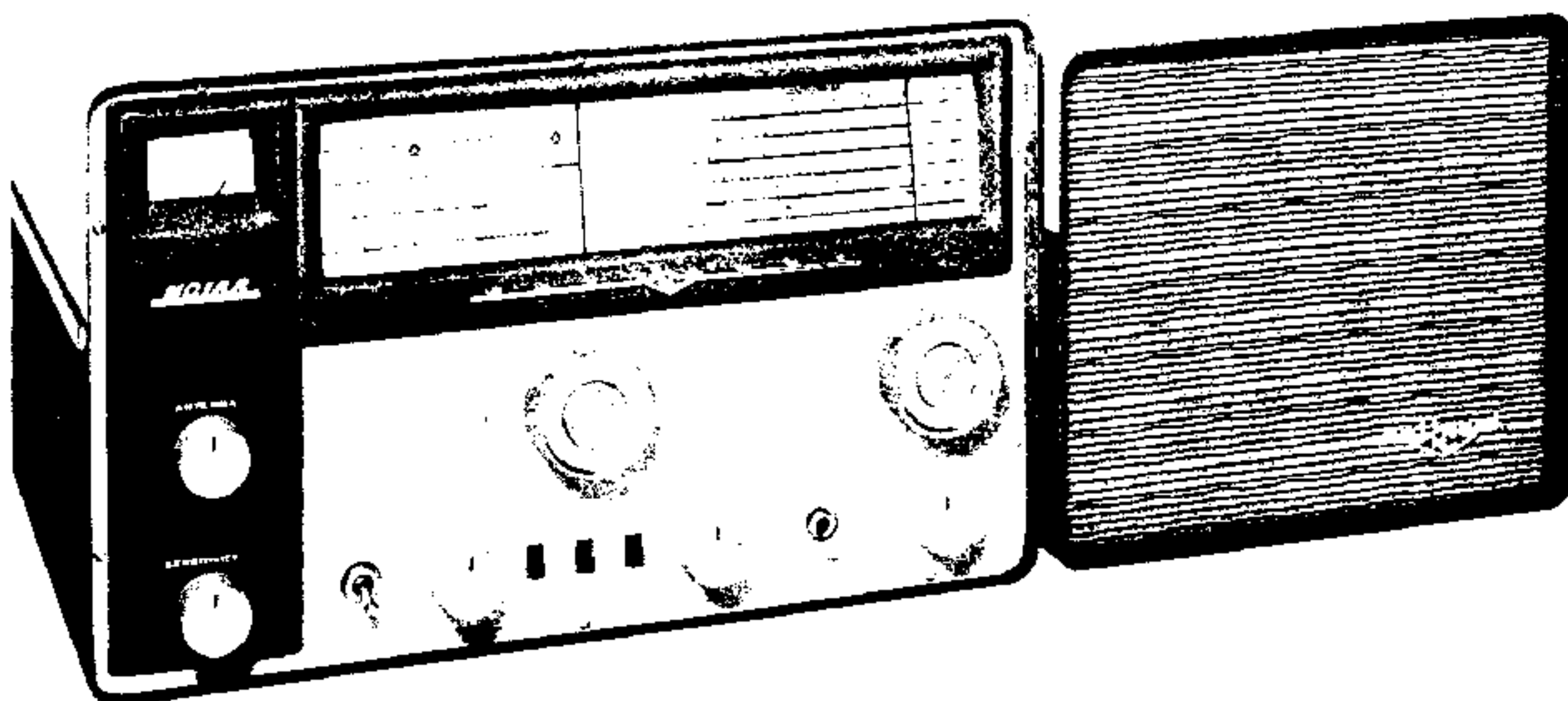


Figure A-1. NC188 with NTS-1 Loudspeaker

The National NTS-1 (figure A-1) is an accessory loudspeaker assembly. Style, finish and electrical properties of the NTS-1 make it a perfect match for your NC188.

